CS 320
Fundamentals of Software Engineering

Lecture 8: System Modeling (1) — Use Cases
System Modeling

- The process of developing abstract models of a system
- Each model representing a different view or perspective of the system
- System modeling has now come to mean representing a system using some kind of graphical notation (which is now always based on UML)
Use of Graphical Models

- As a means of facilitating discussion about an existing or proposed system
- As a way of documenting an existing system
- As a detailed system description that can be used to generate a system implementation
System Perspectives

- External perspective (context, activity)
- Interaction perspective (use case, sequence)
- Structural perspective (class, data)
- Behavioral perspective (state, sequence)
Context Models

- Context models are used to illustrate the operational context of a system - they show what lies outside the system boundaries.
What is a use case?

- A formal way of representing how a system interacts with its environment
- Illustrates the activities that are performed by the users of the system
- A scenario-based technique in the UML
Use Cases

• What is an Actor?
  • A user or outside system that interacts with the system being designed in order to obtain some value from that interaction

• Use cases describe scenarios that describe the interaction between users of the system (the actor) and the system itself
Use Cases

- Use case diagrams describe what a system does from the standpoint of an external observer. The emphasis is on what a system does rather than how.

- Use case diagrams are closely connected to scenarios. A scenario is an example of what happens when someone interacts with the system.
Use Cases

• Use case diagrams describe what a system does from the standpoint of an external observer. The emphasis is on **what** a system does rather than **how**

• Use case diagrams are closely connected to scenarios. A scenario is an example of what happens when someone interacts with the system
Use Cases

Here is a scenario:

“A patient calls the clinic to make an appointment for a yearly checkup. The receptionist finds the nearest empty time slot in the appointment book and schedules the appointment for that time slot.”
Use Cases

- Step 1: Identify the actors

  “A patient calls the clinic to make an appointment for a yearly checkup. The receptionist finds the nearest empty time slot in the appointment book and schedules the appointment for that time slot.”
Use Cases

Step 2: Identify the use case

“A patient calls the clinic to make an appointment for a yearly checkup. The receptionist finds the nearest empty time slot in the appointment book and schedules the appointment for that time slot.”
Use Cases

- Step 3: Communication

“A patient calls the clinic to make an appointment for a yearly checkup. The receptionist finds the nearest empty time slot in the appointment book and schedules the appointment for that time slot.”
Use Cases

- Step 4: System boundary

  “A patient calls the clinic to make an appointment for a yearly checkup. The receptionist finds the nearest empty time slot in the appointment book and schedules the appointment for that time slot.”
A use case diagram is a collection of actors, use cases, and their communications.
Use Case Relations

- Generalization
- Include
- Extend
Use Case Relations
Use case: transfer data

**MHC-PMS: Transfer data**

<table>
<thead>
<tr>
<th>Actors</th>
<th>Medical receptionist, patient records system (PRS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>A receptionist may transfer data from the MHC-PMS to a general patient record database that is maintained by a health authority. The information transferred may either be updated personal information (address, phone number, etc.) or a summary of the patient’s diagnosis and treatment.</td>
</tr>
<tr>
<td>Data</td>
<td>Patient’s personal information, treatment summary</td>
</tr>
<tr>
<td>Stimulus</td>
<td>User command issued by medical receptionist</td>
</tr>
<tr>
<td>Response</td>
<td>Confirmation that PRS has been updated</td>
</tr>
<tr>
<td>Comments</td>
<td>The receptionist must have appropriate security permissions to access the patient information and the PRS.</td>
</tr>
</tbody>
</table>
Exercise

• A video rental system